



Bottomland Hardwood Planting: Example Contract Specifications

by Monica N. Humphrey and Deborah J. Shafer



A bottomland hardwood restoration site in the Yazoo River Basin following initial planting

PURPOSE: This technical note provides an example of contract specifications that can be used as a template by USACE biologists, engineers, or contracting officers for contracting the planting of bottomland hardwood (BLH) seedlings. However, it is not intended to substitute for a basic understanding of appropriate planting techniques and other wetland restoration principles.

BACKGROUND: In the Mississippi Alluvial Valley, there are numerous examples of successful BLH reforestation projects such as the Marked Tree Reforestation Project in Arkansas and the Lake George Wetland/Wildlife Restoration Project in the Mississippi Delta. Typical species selected

for planting depend on site characteristics, but include such species as nuttall oak (*Quercus nuttallii*), water oak (*Q. nigra*), and water hickory (*Carya aquatica*) because of their wildlife value. Other species such as green ash (*Fraxinus pennsylvanica*) and red maple (*Acer rubrum*) are often selected to increase site diversity.

This technical note represents a compilation of information from actual contract specifications for various reforestation projects completed within the St. Paul, Fort Worth, Vicksburg, New Orleans, and Memphis Districts. Each project had specific and unique requirements; thus, the information presented here should only be used as a guide. Restoration issues that may complicate successful establishment such as herbivory, herbicide application, or unfavorable environmental conditions are not addressed.

PLANNING: One of the keys to a successful restoration project is proper planning. Since no two projects are the same, unique project characteristics must be considered. This planning phase involves developing a clear understanding of the physical and biological characteristics of each individual site so that appropriate tree species and planting techniques may be selected.

To ensure the best conditions for tree establishment, a number of factors must be considered, including: optimum planting time, density or spacing, source of planting stock, and the need for site preparation prior to planting. For information on the technical aspects of BLH reforestation, several excellent resources are available, e.g. Haynes et al. (1995) and Allen et al. (2001). Along with

technical issues, administrative concerns such as schedules, status reports, and methods of payment must be addressed in the contract specifications.

CONTRACTS: The usual vehicle of procurement for BLH plantings is a service contract. This method of contracting specifies a fixed effort (number of acres planted) at a fixed price (dollars/acre). Other work associated with project completion, such as application of planting shelters, bushhogging, or herbicide application, can also be included. Service contracts are a competitive form of procurement with the contract generally being awarded to the contractor who can provide the "best value." Best value is determined by taking into account such evaluation factors as prior experience, facilities, equipment, manpower, availability, price, etc. Other types of contracts, such as "Request for Proposals," may also be appropriate depending on the complexity of the work and the need for specialized expertise. For this reason, district procurement offices should be consulted often during the preparation of contracts.

It is important to be as concise and explicit in the contract specification as possible. It should also be noted that the range of tasks to be performed should be limited. If many tasks are needed to complete the overall project, it may be necessary to implement several contracts to ensure successful completion of the project. Effective management of the contract will require frequent meetings with the contractor, preferably onsite, to ensure an understanding of all aspects of the contract. An inspection of the site during the life of the contract is also essential. Any deficiencies should be reported, corrected, and documented.

The remainder of this document serves as a template for preparation of an actual contract. Text boxes with explanatory notes accompany the subsections of this template.

ACKNOWLEDGMENTS: The authors would like to express appreciation to the following USACE employees who provided information and/or materials for this technical note:

Johnny Kiser, CEMVK-OD-MN
Dan Oles, CEMVP-CO-NR
Don Weise, CESWF-OD-R

Richard Hite, CEMVN-PM-E
Carolyn Schneider, CEERD-EE-W
Martin Mayer, CEMVD-OD-SW

POINTS OF CONTACT: For additional information, contact Ms. Monica H. Humphrey, (601) 634-2853; *Monica.N.Humphrey@erdc.usace.army.mil* or Ms. Deborah Shafer, (601) 634-3650; *Deborah.J.Shafer@erdc.usace.army.mil*, or the manager of the Wetlands Research Program, Mr. Glenn Rhett, (601) 634-3717; *Glenn.G.Rhett@erdc.usace.army.mil*. This technical note should be cited as follows:

Humphrey, M. N., and Shafer, D. (2002). "Bottomland hardwood reforestation: Example contract specifications," *WRP Technical Notes Collection* (ERDC TN-WRP-WG-RS-3.5), U.S. Army Engineer Research and Development Center, Vicksburg, MS.
www.wes.army.mil/el/wrp

REFERENCES

- Allen, J. A., Keeland, B. D., Stanturf, J. A., Clewell, A. F., and Kennedy, H. E., Jr. (2001). "A guide to bottomland hardwood restoration. Biological Research Development Information and Technology Report," U.S. Department of Agriculture Forest Service, Southern Research Station, General Technical Report SRS-040.
- Construction Specifications Institute. (1995). "Master Format: Master list of numbers and titles for construction industry," Construction Specification Institute, Alexandria, VA.
- Haynes, R. J., Bridges, R. J., and Gard, S. W. (1995). "Bottomland hardwood re-establishment efforts of the U.S. Fish and Wildlife Service Southeast Region." J. C. Fischenich, C. M. Lloyd, and M. R. Palermo, ed., *Proceedings: Wetlands Engineering Workshop, St. Louis, MO*, Technical Report WRP-RE-8, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 322-334.
- U.S. Army Corps of Engineers. (1993). "Engineering and Design: Plans and Specifications for Civil Works Projects," Engineer Regulation 1110-2-1200, Washington, DC.
- U.S. Army Corps of Engineers. (1998). "Engineering and Design: Specifications," Engineer Regulation 1110-1-8155, Washington, DC.

NOTE: *The contents of this technical note are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such products.*

EXAMPLE CONTRACT SPECIFICATIONS ¹

PROJECT TITLE

SECTION 02900 ²

BOTTOMLAND HARDWOOD PLANTINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification where referenced. Publications are referred to in the text by basic designations only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
ANSI Z60.1 (1990) Nursery stock

AMERICAN JOINT COMMITTEE ON HORTICULTURAL NOMENCLATURE
AJCHN-01 (1942, 2nd Ed.) Standard Plant Names

Comments: The two references listed above have developed selection criteria for the use of nursery stock and the standardization of common names of tree species. The standards used in the text of the actual contract specifications should be included in the "REFERENCES" subsection of the contract. In this example, two relevant references have been listed.

1.2 SYSTEM DESCRIPTION

The work covered in this section includes: a) provisions of all plants, labor, equipment, and materials; and b) performance of all operations in connection with the planting of BLH seedlings in the area shown in the attached drawings ³ and as directed by the Contracting Officer or his authorized representative.

¹ All engineering and design specifications for Corps projects must be prepared in accordance with ER 111-2-1200 (U.S. Army Corps of Engineers 1993) and ER 1110-1-8155 (U.S. Army Corps of Engineers 1998). All Corps offices are required to use SPECSINTACT to prepare construction specifications (ER 111-1-8155 for Construction).

² This number refers to the *Master Format* section entitled "Planting" (Construction Specifications Institute 1995). If applicable, the last two digits of this section number may be changed to reflect a more specific subsection as described in Section 02900 ("Planting") of *Master Format*.

³ "Attached drawings" are referred to in this technical note. Although not present in this example, in an actual contract, scale drawings showing locations and other information would be included.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES of Corps of Engineers Guide Specification (CEGS-01330).¹ Submittals may be classified as “government approval” (GA) or “for information only” (FIO).

Comments: CEGS defines “submittals” as “shop drawings, product data, samples, and administrative submittals presented for review and approval.” This section of the contract provides details about documentation required as part of the project. ER 1110-1-8155 suggests limited use of GA submittals (e.g. for changes in design, critical materials, and/or deviations). In practice, use of the designations “GA” and “FIO” varies among Districts and may have as much to do with past failures and successes with contractors as with District policy.

The Submittal Description (SD) numbering system is based on standard descriptions of 10 possible categories of submittals used by the Corps. These are listed in CEGS-01330.

SD-01 Data

Equipment; FIO

A list and/or description of equipment used for the planting operation.

Comments: If the Corps Contracting Officer believes that there is a need for information about various aspects of the project, that information can be requested as part of the “Data” subsection. CEGS defines “Data” as “submittals that provide calculations, descriptions, or documentation regarding the work.”

SD-08 Statements

Delivery; FIO

Delivery Schedule for equipment, plants, and soil amendments.

Comments: The “Statements” subsection allows the Contracting Officer to request information about how the project will be accomplished. CEGS defines “statements” as “a document, required of the Contractor, or through the Contractor, from a supplier, installer, manufacturer, or other lower tier Contractor, for the purpose of confirming the quality, or orderly progression, of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.”

¹ In an effort to standardize contracting requirements among federal agencies, a new set of Unified Facilities Guide Specifications have recently been approved for use by the Army, Navy, and Air Force. For an update, go to TECHINFO on the Internet at: <http://www.hnd.usace.army.mil/techinfo/gspec.htm>

SD-13 Certificates

Seed source should be from the same geographical region as the site. Prior to delivery of material, Certificates of Compliance shall be submitted certifying that materials meet the specified requirements. Where such certification requires a laboratory test, the test shall be certified and reported as part of the Certificate of Compliance. Testing shall be performed by an approved independent laboratory within 30 days of the submittal of reports. Certified copies of the reports shall be provided for the following:

- a. Seedlings-Nursery name, genetic purity, and location of seed source.
- b. Fertilizers-Manufacturers' chemical analysis and application.
- c. Manufacturers' data-installation and application procedures, specification data sheet of manufacturers' catalog sheets for tree shelters and tree mats.

Comments: This subsection allows the Contracting Officer to require information certifying suitability of some aspect of the quality or nature of materials or labor used in the project. In projects for which maintenance of genetic integrity of plants is considered important, this section can require certification documenting the origin of plant material. CEGS defines "Certificates" as "statements signed by an official authorized to certify on behalf of the manufacturer of a product, system, or material meeting specified requirements." The statement must be dated after the award of the contract, must state the Contractor's name and address, project name, and location, and list the specific requirements that are being certified.

SD-14- Samples

Tree shelters; GA
Tree mats; GA
Anchors for tree mats; GA

Comments: The Contracting Officer may want to inspect materials to be used in the project. CEGS defines "samples" as "...physical examples of materials, products, and units of work as complete units or as portions of units of work."

SD-18- Records

Maintenance; FIO

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory tree survival.

Comments: This section allows the Contracting Officer to request records documenting compliance with various contract requirements. CEGS defines "records" as "documentation to record compliance with technical or administrative requirements."

1.4 SOURCE INSPECTION

All shipments or orders of plant material shall be subject to inspection at the nursery or at the site by the Contracting Officer or an authorized representative.

Comments: Throughout this example, the source of plant material is assumed to be nursery stock. If donor sites are used as the source of plant material, routine inspections of donor sites should be mandatory to discourage any environmentally damaging practices.

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

The Contractor shall provide for the proper collection of plant material before planting.

1.5.1 Collection

Digging and preparation for shipment shall be done in such a manner that they will not cause shock or damage to branches, trunk, or root systems.

a. Bare-root (BR) seedlings.

Minimum root spread shall be as recommended by an ANSI-01. A well-branched root system characteristic of the variety specified shall be provided. No roots shall be pulled from the ground. The root system should be protected from desiccation.

Comments: This section allows the Contracting Officer to make recommendations based on the references for the collection, handling, delivery, and storage of plant material.

b. Container-grown seedlings. Container size shall be provided as recommended by ANSI-01. Plants shall be grown in a container sufficiently long enough for a few fibrous roots to have developed and for root mass to retain its shape and hold together when removed from container. Container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

1.5.2 Delivery and Inspection

The Contractor shall promptly notify the Contracting Officer, in advance, when the plant material will be delivered and the manner of shipment. The Contracting Officer or authorized representative shall inspect plants upon delivery at the job site for species identity and conformity to quality requirements. Unacceptable plant material (i.e., dessicated, diseased, insect-infested, lack of root biomass) will be removed from the job site at no additional cost to the government.

1.5.3 Storage

Should planting not occur on the day of seedling arrival, the Contractor shall store and care for the plants in an area approved by the Contracting Officer. Seedlings should be protected from exposure to wind and direct sunlight until planted. Stock should be cold stored, or covered in straw, moist burlap, or other material, as approved by the Contracting Officer, until time of installation, which should be no longer than 3 days under any circumstances.

Comments: Specific instructions for storing seedlings may vary for different species, but maintenance of root moisture and protection from sun and wind prior to planting are essential.

1.5.4 Handling

Care should be taken to avoid desiccation or damage to plant material when being moved from source or storage site to the planting location.

1.5.5 Time Limitations

Trees shall be planted within 24 hr of delivery if possible. If this is not possible, seedlings should be stored in the manner described above in Section 1.5.3.

Comments: If planting area is too large to complete within a 3-day time limit, or other time restrictions as specified by the Contracting Officer, staged shipments and subsequent planting can be specified.

PART 2 PRODUCTS

2.1 BLH SEEDLINGS

2.1.1 Species

Nuttall oak (*Quercus nuttallii*)

Green ash (*Fraxinus pennsylvanica*)

Water hickory (*Carya aquatica*)

Red maple (*Acer rubrum*)

Comments: Species to be planted and planting elevations will vary depending on the soil, hydrology, desired wetland function, and other factors. Flood frequency and duration must be taken into account. Number of seedlings will be determined by the project size, planting density, and other site characteristics deemed important by the Contracting Officer.

Plants shall be nursery grown or plantation grown stock conforming to ANSI-01. They shall be of the varieties on the designated plant list specified by the Contracting Officer bearing botanical names as listed in AJCHN-01.

2.1.2 Substitution

Substitutions will not be permitted without written request from the Contractor for approval by the Contracting Officer. Proposed substitutions must possess the same essential characteristics as the kind of plant actually specified in regard to appearance, height, shape, habit of growth, general soil, and other requirements.

2.1.3 Quality and Size

Quality and size of the plants shall be in accordance with the rules and grading adopted by the ANSI Z60.1. All plant material shall be nursery-grown, well-branched, and well-proportioned, particularly with respect to width-height relationship, and shall have a fibrous root system. The seedling source shall be from the same geographical area in which the seedlings are to be planted. The Contracting Officer may inspect plants prior to planting, but such inspection shall not preclude the right of rejection at the site.

Comments: In this section, the Contracting Officer can specify size and quality of seedlings based on standards stated in the REFERENCE section of the contract. Specific height, root collar diameters, number of buds, and other specific characteristics are possible criteria.

2.1.4 Nomenclature

The scientific and common names of trees herein specified conforms to the approved names given in AJCHN-01.

2.2 TREE SHELTERS

- a. Tree shelters shall be standard products of a reputable manufacturer whose normal business is production of tree shelters to be used for the purpose of protecting trees from damage due to small animals, mowing, and application of herbicide, for the purpose of providing support, and for the purpose of providing improved growing conditions for seedlings through the recycling of moisture.
- b. Tree shelters shall be constructed of a translucent plastic polymer that is UV-stabilized for 5 years; seamless twin-walled around entire circumference, and has a continuous scrape-free rim.
- c. Tree shelter shall be 1200 mm long and approximately 100 mm in diameter with a minimum diameter of 90 mm.

- d. **Stakes for supporting the tree shelters shall be solid hardwood, 25-mm square, and either pencil pointed or double-cut pointed. The length of the stake shall be as recommended by the tree shelter manufacturer.**

2.3 TREE MATS

Tree mat shall be the standard product of a reputable manufacturer whose normal business is the production of mats to be used for the purpose of protecting trees from the growth of adjacent weeds.

1.2.1 Tree Mat Material

Tree mats shall be constructed of black polyethylene that is UV stabilized for 3 years and porous, yet blocks 90 percent of the sunlight.

2.3.2 Tree Mat Size

Tree mats shall be 1 m square and 63.5 um thick.

2.3.4 Anchors

Tree mat anchors shall be 2.69-mm-thick wires formed into staples measuring 150 mm by 25 mm by 150 mm.

2.4 ANTIDESSICANT

Antidessicant shall be an emulsion that will provide a film over tree surfaces permeable enough to permit transpiration and shall not damage the plant.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Planting Season

The planting season for seedlings depends on the geographical location of the site. For instance, if the site is in the lower Southeast, planting should occur during the time frame from December 1 to February 28. Actual planting shall be performed during the specified periods only when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved by the Contracting Officer. Deviation from the planting dates will be permitted only when approved in writing by the Contracting Officer.

3.1.2 Planting Conditions

Planting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the planting operations, proposed planting times should be submitted to and approved by the Contracting Officer.

3.1.3 Installation

Trees shall be plumb and held in position until sufficient soil has been firmly placed around roots or ball. Trees shall be set in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery or container.

Comments: Care should be taken to avoid damage to seedlings. Roots shall not be pruned unless deemed necessary by the Contracting Officer's Representative. Roots shall be planted vertically with only lateral roots in a horizontal plane. The planting hole shall be large enough to allow the roots of the seedling to disburse within the soil. Roots shall not be twisted, balled, or planted in "U-," "J-," or "L-"shaped manner. Soil shall be firmly tamped around planted seedlings.

a. Bare-root seedlings.

Bare-root tree seedlings shall be installed by arranging the roots in a natural position. Damaged roots shall be pruned prior to planting. Trees shall be back-filled with topsoil carefully worked in among roots.

b. Container-grown seedlings.

Non-biodegradable containers or platforms shall be removed without damage to the plant or root system. Biodegradable containers shall be split. Backfilling shall be completed.

3.1.4 Planting Layout

Seedlings shall be planted in rows, in no case closer than within 15 ft of each other. Seedlings shall be planted at the rates indicated in PLANT SCHEDULE (below) for 300 seedlings per acre. Species composition within rows should be mixed in an irregular or random fashion. Location of plants and outlines of the areas to be planted shall be marked on the ground by the Contractor and approved by the Contractor's Officer before site preparations or planting.

Comments: The Contracting Officer can specify the rate of seedlings per acre based on site characteristics, desired functions of site, and species chosen to plant. Exact locations of planting should be indicated such as within adjacent ditches, berms, or slopes.

Plant Schedule

TREES: 185 per acre required, 37 of each species ($37 \times 5 = 185$).

<u>Botanic Name</u>	<u>Common Name</u>	<u>Remarks</u>
<i>Quercus nigra</i>	Water oak	
<i>Quercus nuttallii</i>	Nuttall oak	
<i>Quercus lyrata</i>	Overcup oak	
<i>Carya aquatica</i>	Water hickory	
<i>Nyssa sylvatica</i>	Black gum	

TREES: 65 per acre required, 16 of each species (16×4) + 1 of any of the species listed = 65 trees.

<u>Botanic Name</u>	<u>Common Name</u>	<u>Remarks</u>
<i>Fraxinus pennsylvanica</i>	Green ash	
<i>Ulmus crassifolia</i>	Cedar elm	
<i>Nyssa aquatica</i>	Swamp tupelo	
<i>Taxodium distichium</i>	Bald cypress	

3.1.5 Site Preparation

Any obstruction such as rocks or other debris should be removed to the depth necessary to permit proper planting, according to plans and specifications.

Comments: The Contractor shall familiarize him/herself with all existing underground utility locations and shall avoid any damage during planting operations.

3.1.6 Protection of planting area

Before planting or excavations are made, precautionary measures shall be taken to protect all areas. Existing trees and shrubs that are to be preserved shall be barricaded in a manner to afford effective protection during planting operations.

4.1 MAINTENANCE

4.1.1 Inspection

Planting maintenance shall continue for 1 year after completion of the work. During this period, plants that die or are, in the opinion of the Contracting Officer, in an unhealthy or impaired condition shall be replaced by the Contractor prior to acceptance of the project by the Government. Such replacements shall be made in the same manner as specified for the original planting at no additional cost to the Government.

A record of each site visit shall be furnished describing the maintenance work performed, areas repaired or reinstalled, and diagnosis of reasons for unsatisfactory stand of trees.

Comments: This section allows the Contracting Officer the opportunity to develop a site maintenance plan containing specific requirements (e.g., maximum spacing of surviving trees should not be more than 15 m, minimum 80 percent survival of heavy-mast-producing species, or a minimum overall seedling survival of 60 percent). Typical reforestation efforts are targeted for functions, which play a major role in determining what criteria are needed to deem the site a successful planting operation.

4.1.2 Final inspection

All plants will be inspected for a final time after any replacement plantings have been completed. The final inspection will be considered final acceptance, provided the contractor has complied with the above-listed maintenance plan. Final acceptance will be delayed until replacement or adherence to the maintenance plan has been satisfactorily accomplished.